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ABSTRACT

Recent reform documents have identified practitioners' lack of awareness and implementation of exemplary, innovative practices, and major national associations have noted the ongoing gap between research and practice. The literature supports collaborative action research and teacher researchers as methods to expand the base of educational research and educational knowledge. Following an extensive literature review, this paper describes the Academic Challenge Program (ACP) at the Ohio State University at Newark in a 6-year program funded by the state of Ohio Board of Regents. ACP focuses on action research designed to facilitate the collaborative, systematic development of research-based, innovative educational practices. The program aims to encourage and support professional development of teachers, encourage use of research to improve classroom practice, and develop and disseminate effective and innovative materials that have been classroom-tested through action research. The program's three interrelated phases are pedagogical awareness; research, development, and evaluation; and classroom application. The 1988-89 ACP program involved 19 elementary and middle school teachers selected through an application and recommendation process. The innovative activities developed involved art, mathematics, reading, science, social studies, and writing and featured deliberate integration of technology (calculators, computers, overhead projectors, and video) into the teaching and learning process. Data analysis based on teacher attitude and perceptual scales suggests that participants made significant growth toward the ideal as perceived by program staff. (53 references) (MLH)

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Symposium:
What Should Scientific Research Look Like in Science Education?

ACTION RESEARCH AS A SOLUTION TO THE PROBLEM OF KNOWLEDGE UTILIZATION

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INTRODUCTION

Among the issues identified by recent education reform documents is that of the lack of awareness and implementation of exemplary, innovative educational practices by teachers and others within the education community. Related to this issue, the major national and state education associations have identified the recurring problem of the lack of communication between educational researchers and educational practitioners or bridging the gap between research and practice.

Significant improvements in education should result from the systematic development of research-based knowledge. The literature supports action research as one of several research methods to be used in expanding the base of educational research and educational knowledge — one which seems to have much promise in the current era of reform in education. Important gains in research-based knowledge are made when research efforts are collaborative between teacher educators, educational researchers, and educational practitioners. Classroom teachers can and should play an important role in research. This general view supporting the merits of collaborative action research and the teacher as researcher is reflected in two recent publications Teacher as Researcher (Theory into Practice, Summer, 1990) and The Reflective Educator (Educational Leadership, March, 1991).

The role of the classroom teacher in a collaborative research team has also been suggested as a means for science education research to inform and affect practice. In the third edition of the Handbook of Research on Teaching, a project of the American Educational Research Association, White and Tisher (1986) reflect that while a great deal of science education research has been conducted over the last decade, very little has affected practice. One of their suggestions to met this challenge is for "... teachers to become full members of the [research] teams. This development may lead to a different, collaborative style wherein research is done by and with, rather than, on the teacher." (p. 897)

Shymansky and Kyle, Jr. (1991) in their document Establishing a Research Agenda: The Critical Issues of Science Curriculum Reform provide a strong rationale for the use of the collaborative action research model in science education research. They list among their four principles

> " ... research should be for educational reform, not about educational reform: it should unify - not separate - the work of educational theorizing and practice... The collaborative action research model brings together teachers, researchers, staff developers, and others interested in the reform for the purpose of improving practice. Its goal is to empower teachers to become self-reflective researchers, that is, practitioners who can examine their own practice critically. Through the process of investigating and reflecting, teachers become more flexible in their thinking, more receptive to new ideas, and more adept at converting a problematic situation into a problem to be resolved. Collaborative action research also enables teachers to clarify, modify, and elaborate the theories that inform their instruction. Thus, it offers a method for testing and improving educational practices." (p. 15).

> "Our understanding of science teaching and learning will be enhanced by practitioners and researchers theorizing, planning, conducting, and interpreting research that is pedagogically valid. Enhanced communication and collaboration should inform the process and influence practice." (p. 40).

The view of science education research advanced by Shymanksy and Kyle, Jr. is both participatory and collaborative, guided by critical reflection and an epistemology that is constructivist. Their support of collaborative action research is premised upon the belief that it will facilitate the linking of theory and practice and research and action.

The National Association for Research in Science Teaching (NARST) has endorsed the collaborative action research model and the teacher-as-researcher movement. Their conviction that teachers should be informed, reflective, inquiring professionals involved in action research is reflected in a series of publications entitled Research Matters ... To the Science Teacher and the establishment of the Ad Hoc Committee on Classroom Liaison. The Ad Hoc Committee on Classroom Liaison was instrumental in organizing a symposium entitled "Models of Collaborative Research - University Faculty and Classroom Teachers as Partners and Peers" which was held at the NARST Annual Meeting, March 30 - April 1, 1989 in San Francisco, CA.

ACTION RESEARCH: LITERATURE REVIEW

Historical Background

In general, Kurt Lewin (1946) is credited as the founder of the action research movement during the 1940s in his construction of an elaborate theory of action research and in his making this process a respectable avenue of inquiry. Corey (1953) and Shumsky (1958) applied Lewin's action research model to the field of education and encouraged teachers to become researchers in their classrooms. However, McKernan (1988b) traces the roots of action research to the science-in-education movement of the late nineteenth century. He cites the work of Buckingham as being influential in promoting the teacher as researcher. McKernan notes, however, that the actual term action research is first encountered in the work of Collier, U.S. Commissioner on Indian Affairs. Chall (1986) reports that the 1950s and 1960s were characterized by a decline in the use of collaborative research methods and an emphasis on theoretical research conducted by universities and research centers. The return of action research appeared in the 1970s with a change in title from action research to interactive research and development. The emphasis in this era of revitalization was on collaboration. Interest has continued to grow in the 1980s with the work of Carr, Kemmis, and McTaggert (see for example Carr & Kemmis, 1986; Kemmis & McTaggert, 1988) as evidenced in the amount of available literature on this topic.

Definitions

Kemmis and McTaggert (1988) define action research as "a form of collective self-reflective enquiry undertaken by participants in social situations in order to improve the rationality and justice of their own social or educational practices, as well as their understanding of these

practices and the situations in which these practices are carried out" (p. 5). McKernan (1988a) supports this view in stating that "the purpose of action research is to solve pressing day-to-day practical problems and to increase our understanding of problems. It is on-the-site inquiry aimed at problem resolution" (p. 154). Ebbutt (1985) offers a definition that has been synthesized from those available. Action research is "about the systematic study of attempts to change and improve educational practice by groups of participants by means of their own practical actions and by means of their own reflection upon the effects of those actions" (p. 156).

McKernan (1988b, pp. 186-193) offers sixteen key concepts that characterize action research.

1. Increased human understanding.
2. Concern to improve the quality of human action and practice.
3. Focus on problems of immediate concern to practitioners.
4. Collaborative.
5. Conducted in situ.
6. Participatory character.
7. Focus on the single unit, or case.
8. No attempt to control setting variables.
9. The research problem and goals may shift as inquiry proceeds.
10. Evaluate attempts to explain the amount of participants' growth.
11. Methodologically eclectic and innovative.
12. Scientific.
13. Shareability-utility.
14. Dialogical-discursive.
15. Critical.
16. Emancipatory.

Benefits

- **To take advantage of differing perspectives and expertise**
- **To inform classroom practice to improve teaching and learning**
- **To break down the traditional hostility of teachers to researchers**

Rainey (1973) states that "if change is going to wrought in the classroom by research, that research in large measure is going to have to be teacher-initiated action research" (p.371). Watts (1985) addresses the gulf between research on effective teaching and actual teaching practice. She states that teachers see research findings as "contradictory, impractical, faddish, and fickle" while researchers see teachers as "unresponsive, indifferent, unreflective, and ...passive at best, incompetent at the worst" (p. 118). Watts views collaborative research as the necessary bridge between the two groups and their positions.

Teachers currently view educational research as an unnecessary expense with results obtained in a situation that is too artificially arranged to have meaning for classroom practice (Kelly, 1985). Enochs and Hortin (1985) posit that if teachers participate in naturalistic inquiry within their classrooms, they will accept research findings and willingly use them in their teaching.

Ross (1984) concludes that action research can "help us view research as integrated with practice rather than as a process which is conducted separately and then implemented in classrooms" (p. 114). Ross bases her conclusions on the work of Huling, Trang, and Correll (1981) who found that teachers who conducted research were more likely to use not only their own findings but those of others.

- **Contribute to teacher learning & understanding**

The following quotes reported by McConaghy (1987) express the positive feelings held by teacher-researchers: "Classroom research means learning through doing, and it can be an energizing experience ... an opportunity to understand what is meant by the act of teaching" (p. 631). "The opportunity to contribute to educational research allow the teachers to become more confident and to grow." (p. 631).

Watts (1985) views collaborative research as "a way for excellent teachers to keep the early challenge of teaching alive" (p. 119). Bissex (1986) theorizes that action research contributes to teachers' learning because it promotes reflection on their teaching. McConaghy (1986) states that her experiences as teacher-researcher provided the "opportunity to construct and to build my own knowledge about some of the things I was doing in the classroom and to build this knowledge in such a way that it helped me to understand children and learning more fully" (p.724). Ross (1984) supports action research as a way to make teachers aware of the decisions they make, accept responsibility for decision-making, and be willing to evaluate their decisions using appropriate means.

- **Problems best solved by those involved**

Taba and Noel (1957) define action research as "that research which is carried on by educational practitioners to solve their own problems" (p.1-2). Burton (1986) concurs and believes that action research is based on personal experience.

Limitations

In reviewing the available literature dealing with the topic of action research, numerous specific examples of action research projects were found with details about the structure of the experience and anecdotal evidence as to its success. It is difficult to judge the true impact made upon teachers and the educational benefits when little empirical data is available or reported. Some of the limitations and/or problems associated with collaborative action research include communication, inability to generalize findings, lack of funds and resources, lack of rigor related to research design and analysis, lack of support and time, lack of teacher research knowledge and experience, personal relationships, and process versus product dilemma.

Guidelines

Based upon the literature review, several key considerations emerge to guide action research projects. They include collaboration, communication, time, support, and recognition.

Collaboration is one of the most important aspects of the action research. As Kyle and McCutcheon (1984) indicate, collaboration does not mean cooperation but should imply

co-investigation. Teachers should not be relegated to the role of consultant but should be actively involved in all aspects of the research process. This is supported by the results of Allen, Combs, Hendricks, Nash, and Wilson (1988) who noted that the sharing process was the most interesting component in action research. The people, colleagues and experts, were found to be the most important resources. Hatch and Bondy (1986) suggest that researchers can improve their investigations by establishing good relationships with the teacher participants. They note that this will take time and effort and can not be simply left to chance. Johnston (1990) reflects on the complexities of working in a collaborative manner — the difficulty of conversation and interpretation within the group and the construction of joint interpretation.

Communication is an important aspect of collaboration and often overlooked. Teachers and researchers do have different perspectives and it is important that the action research documents reflect the views of both. As Plant (1986) states, "Language is undoubtedly a major stumbling-block to a more pronounced influence of research on practice" (p.129). It is noted that unless the argument can be communicated to the targeted audience, it has no chance of influencing the learning in the classroom. Florio-Ruane and Dohanich (1984) noted communication differences in their review of the written project results of teachers and researchers. They theorize that the two groups are involved in different "speech communities" with different research rationales and different ways of speaking about research. The solution is not to simply translate for the teachers, this perpetuates the one-way research relationship, but to allow the two groups to deliberate about the research.

Allan and Miller (1990) suggest that the success of an action research project is related to the empowerment of teachers through the provision of tools, support, and the opportunity to display their professional expertise within the classrooms, schools, and educational community. Sagor (1991) discovered that the participants who were successful were those who felt they were researching an important issue, that had established collegiality, and had support of colleagues and external groups. Lasky (1978) confirms the importance of support and guidance to action research. She states that "it is important for administrative and supervisory personnel to give the guidance and support necessary to enable more teachers to design and engage in action research" (p.64). Elliott and Adelman (1973) suggest that time and the need for recognition and reward are serious considerations in supporting the research of teachers. That is, teachers need to be given time for participation, support from administration and other collaborators, recognition for their efforts and contributions, and the opportunity for collaborative communication of the results. Patterson (1985) notes that not all teachers have the ability and knowledge necessary to handle the complexities found in classrooms, but by encouraging teachers to become researchers, teachers may use research findings to inform practice. Action research may affect not only *theory* but *praxis* in a positive way.

Specific guidelines for conducting action research in public school settings are provided by Ross (1984). The first step is the development of a rationale justifying the importance of action research. The second step in the development is the acceptance of a collaborative research model. The use of collaboration will help to address questions of cost and the sharing of expertise between teachers and researchers. To encourage participation, the model developed must help teachers develop a realistic and varied definition of research, must find ways to provide time for teachers to conduct research, and must develop ways to reward research activity. Included in the model should be systematic instruction to develop teachers' research

skills and provisions for providing ongoing individual consultation. It is important that the model developed include a systematic way for the teacher participants to share ideas. Ross concludes by noting that not all teachers will be interested in an action research project and that teachers participating in action research must be involved in all of the decision making about their research projects.

General Models

If action research is chosen as a vehicle to contribute positively to educational research and inform and reform classroom practice, then appropriate models must be used or constructed. These models should take into account those considerations discussed in the previous section. Three general models of action research will be discussed.

The most common model of action research follows from the work of Lewin. The classic or Lewinian method for action research describes the process as proceeding in a spiral of steps. Each spiral is composed of planning, action, observation, and reflection. This same approach is adopted by Kemmis (1981) and Elliott (1981) as reported in Ebbutt (1985).

McKernan (1988a, 1988b) modifies the Lewin model in his Process Model. The important difference lies in the problem being allowed to shift and modify itself from cycle to cycle throughout the project rather than remaining static.

Oliver (1980) presents action research as a useful inservice framework that can help develop teachers' skill in inquiry and analysis. The action research model he outlines is the Interactive Model developed at the Far West Laboratory. Oliver's (1980, p. 395) guidelines include:

- *Stage one*: The supervisor helps teachers and other school personnel identify, clarify, and categorize problems in the class and school environment. This may involve the aid of a consultant, if necessary.
- *Stage two*: The supervisor assembles pertinent readings and project materials for use by school personnel involved in the problem. Here again, a consultant may prove necessary.
- *Stage three*: The teacher studies the material for solutions that may apply to the problem at hand. With the assistance of the supervisor and consultant, the teacher then forms a plan of action. Whether and how to modify the teacher's plan, or to develop alternative solutions, should be a cooperative decision.
- *Stage four*: This is the point at which on-site research occurs. The teacher's plan is evaluated for its classroom effectiveness based on data from observation, teacher reports, testing, or a combination of these. The supervisor and consultant should assist the teacher to assure that proper and effective verification techniques are employed.
- *Stage five*: In conjunction with the plan's implementation, the supervisor should provide ongoing review and support. Specific points of success and failure should be collaboratively noted and analyzed.
- *Stage six*: The final stage of the cycle is overall evaluation of the plan's success and a review of alternatives to bolster areas still deemed weak. In effect this may become the first stage of a new cycle leading to further refinements in solving the problem.

ACADEMIC CHALLENGE PROGRAM (ACP) DESCRIPTION

The Academic Challenge Program (ACP) at The Ohio State University at Newark (OSUN) is a six-year program funded by the State of Ohio Board of Regents. The focus of the Academic Challenge Program is action research designed to facilitate the collaborative, systematic development of research-based, innovative educational practices. Generally, the program is designed to bridge the gap between educational theory, research, and classroom practice. Specifically, the aims of the program are to encourage and support the professional development of teachers, encourage the use of research to improve classroom practice, and develop and disseminate effective innovative methods and materials that have been classroom-tested through action research. The ACP teachers are actively involved in the development, implementation, evaluation, and dissemination of innovative teaching and learning methods and materials.

The ***general goals*** of the program are to:

- **promote collaboration between institutions of higher learning and state educational systems including practitioners and administrators;**
- **provide leadership in the identification of educational needs and problems;**
- **provide leadership in the identification of new knowledge about teaching and learning;**
- **provide leadership in the translation of new knowledge into classroom practice;**
- **provide leadership in the evaluation of new classroom practices; and**
- **provide leadership in the dissemination of research findings and instructional materials.**

The ***specific objectives*** of the program are to:

- **provide teachers with knowledge and experiences related to innovative teaching methods and materials;**
- **provide teachers with knowledge and experiences in order to conduct classroom-based research; and**
- **develop, implement, evaluate, and disseminate innovative teaching methods and materials.**

Teachers should be actively involved in the development, implementation, and evaluation of innovative teaching and learning experiences for their classrooms. This involvement requires additional skills supplemental to those currently offered in the graduate education program. The

addition of knowledge, skills, processes, and experiences related to innovative practices and their evaluation through action research are a major focus of this program. The Academic Challenge Program has been designed to fulfill this need. ACP consists of three interrelated phases: Pedagogical Awareness; Research, Development, and Evaluation; and Classroom Application. Figure 1 illustrates the relationship between components of the ACP and the academic year.

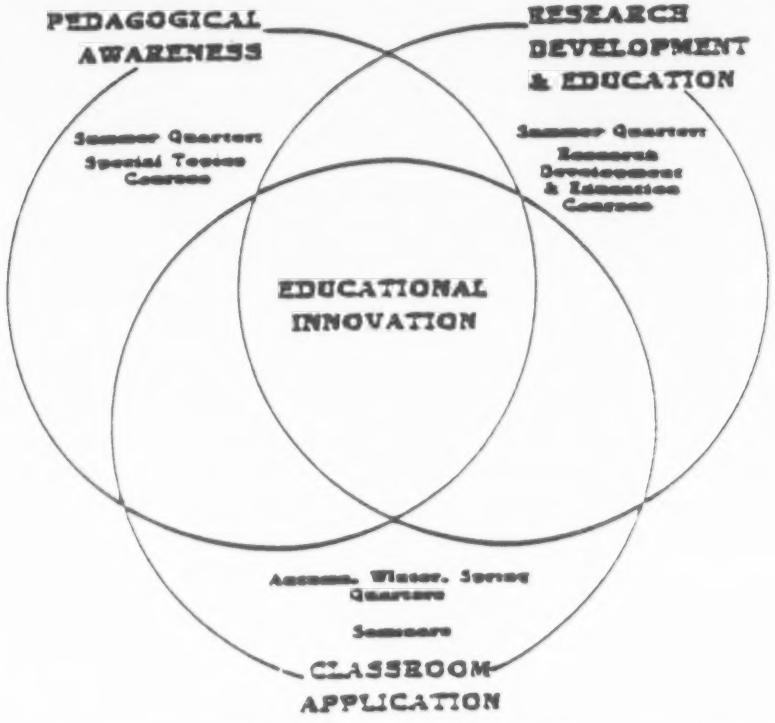

Figure 1 The Three Phases of the Academic Challenge Program (ACP)

The "Pedagogical Awareness Phase" consists of one to two special topics courses (two graduate credits each) developed each Summer Quarter. These courses vary each summer. These special topics courses are selected based upon expressed needs of the educational community, current topics of interest, national and state concerns, and the state requirements for teachers education certification. The following special topics courses have been developed for the Education Academic Challenge Program : Integrating Technology into the Classroom; Community Resources: An Educational Imperative; Developing A Whole Language Curriculum; Teaching Science, Technology, and Society in the Classroom; Visualizing the Curriculum; Teaching Thinking in the Classroom; and Multicultural Education in Today's Schools.

In addition, a "Research, Development, and Evaluation (R D & E)" course (three graduate credits) is taught every Summer Quarter. This course, Action Research: Solving Educational Problems in the Classroom, prepares the students in the fundamentals of inquiry in education. It is designed to prepare teachers for conducting inquiry in education and encourage their self-reflection, professional growth, and involvement in the development and evaluation of innovative

practices. It includes literature search strategies and basic concepts and principles of research design, sampling, measurement, statistical inference, data analysis, and interpretation related to both quantitative and qualitative paradigms. The participants experience the use of a variety of data sources and collection procedures such as archival records, observations field notes, interviews, artifact collection and analysis strategies such as coding, categorizing, inductive analysis, triangulation, data displays, database manipulation, and descriptive narration. The primary goal of this course is to give the teachers the knowledge, skills, and processes necessary to engage in action research. This will enable them to plan innovative activities and obtain quantitative and qualitative evidence as to the effects of these innovations on achievement and attitude/perceptions. The R D & E course is coordinated with the special topics course offerings by using relevant examples.

During the academic year (Autumn, Winter, Spring Quarters), three 1-credit seminars are provided to facilitate and support the translation of the "Pedagogical Awareness" and "Research, Development, and Evaluation" experiences of the summer into Classroom Applications including exploration (piloting), development, implementation, and evaluation activities. These seminars are designed to provide ongoing review and support for the classroom-based research and continuous feedback for program modification. The seminar foci are: Autumn Quarter - development of innovative teaching materials and evaluation instruments, Winter Quarter - implementation of the innovative projects in the classroom and collection of pre- and posttest data, and Spring Quarter - data analysis, report writing, and oral presentation.

As a culmination to the program and as a dissemination mechanism, at the end of the Spring Quarter a two-day conference is held at one of the State Park Lodges. Conference attendees include the faculty and staff of the Academic Challenge Program; the teachers selected to participate in the Academic Challenge Program; and invited guests representing the university and school administrators including superintendents, principals, and supervisors. The conference brings together professional educators to share their innovative ideas and research studies in order to facilitate professional development and improve education. The purpose of this conference is to share experiences, innovative instructional materials and activities, research findings, and reflectively evaluate the Academic Challenge Program. The conference program includes an overview of the Graduate Education Academic Challenge Program, oral presentations describing the innovative teaching materials and the research findings by each Academic Challenge participant, displays of the innovative teaching materials and copies of the project reports, and discussion and synthesis time. This conference also provides formative evaluation information; the teachers serve in an advisory capacity for program modification and improvement. The reports presented at this conference are published in the form of a Proceedings. Each report consists of two parts: a description of the innovative activity developed and implemented by the classroom teacher and a report of the research results related to the evaluation of the innovation. These Proceedings are distributed to all conference participants.

As a means to maintain contact with and obtain follow-up data related to former ACP participants, a yearly informal get-together is held. Current ACP participants and faculty as well as those from all previous years are invited to attend. Refreshments are provided and videotapes from past ACP Conferences are available for viewing. A follow-up questionnaire is distributed which elicits information related to ACP presentations/publications, publicity, informal

discussions, use and/or modifications of their educational innovation and research findings, use of course information, new action research projects, changes in their teaching, graduate school plans, and suggestions for improvement of the program. The informal conversations and advice are invaluable and motivating to the current ACP participants and are stimulating and revitalizing to the past participants.

It is also a goal of the program to collect materials and activities which are produced in the program and make them available to other schools and teachers. The results of these action research projects, both in the form of new knowledge and of tested innovations, are made available through reports at local, state, regional, and national professional meetings; though inservice seminars and workshop presentations; and through local, state, and national level publications.

Program Participants

In order to be eligible for the Academic Challenge Program, potential participants must 1) hold an earned baccalaureate or professional degree; 2) be a K - 8 teacher in the seven county area surrounding Newark, Ohio; 3) have a 2.70 undergraduate GPA or better (based on a 4.00 system); and 4) have a 3.00 GPA or better in previous graduate work. Applicants are required to fill out an application form which requests the following information: name, home and work address and telephone number, grade(s) taught, current grade(s), subject areas, years of teaching experience, degrees, undergraduate and graduate grade point average, graduate courses, inservice courses/workshops, professional association memberships, professional presentations/publications, grants/honors/awards. In addition, the applicants have to provide a written description of how their professional goals relate to the goals of the Academic Challenge Program. A copy of undergraduate and graduate transcripts along with a letter of recommendation from a principal, supervisor, superintendent, department chair, or other administrator is also required.

The participants in the program are expected to be involved for 12 months. The quarterly components of the program include: Summer Quarter, two 2-hour-courses and one 3-hour-course; Autumn Quarter, one 1-hour-seminar; Winter Quarter, one 1-hour-seminar; and Spring Quarter, one 1-hour-seminar and a 2-day-conference at a State Park.

Program Support

The participants each receive 10 graduate credit hours of tuition-free coursework, funds for 1/2 day of substitute teacher support, and expenses to cover a two-day retreat in the spring. Monies are also provided to purchase resources (assessment instruments, books, equipment, and instructional resources) necessary to develop, implement, and evaluate the educational innovations.

1988-1989 ACADEMIC CHALLENGE PROGRAM

Description of Participants

Two hundred fifty program description and application forms were mailed in February, 1988 to all elementary and middle school buildings and superintendent offices in the seven county service area of The Ohio State University at Newark. Nineteen classroom teachers were selected through an application and recommendation process for the 1988-1989 Academic Challenge Program.

The selected participants reported teaching experience from the kindergarten level through senior high school. Currently, they are teaching kindergarten through sixth grade; elementary art, Chapter I reading, and learning disabilities; and middle and junior high reading and mathematics in six of the seven targeted counties. The participants' years of teaching experience range from two to over twenty years with an average of 8.4 years. Each of the teachers has a four-year baccalaureate degree in education with two reporting completion of their Master's Degree. The average undergraduate grade point average is 3.18 (on a four point system). Of the nineteen participants, seventeen reported having completed some graduate courses and seven had been involved in the preparation and/or delivery of professional publications and/or presentations.

1988-1989 Courses

For the first year of the ACP (1988-1989) only one special topics course along with the Research, Development, and Evaluation (R D & E) course was scheduled during the Summer Quarter. Two special topics courses along with the R D & E course have been offered during the Summer Quarter of the subsequent program years. During the academic year (Autumn, Winter, Spring Quarters), the one-credit Classroom Application (Development, Implementation, Evaluation) seminars were scheduled.

"Integrating Technology into the Classroom", the special topics course was designed to acquaint teachers with theoretical, research, and practical-based criteria to evaluate, select, and integrate educational technologies into the classroom. Technological instructional resources include audio-visual equipment, calculator, and computer. The course is designed to explore ways to use technology to its fullest potential as an educational tool and includes topic s such as the integration of manipulatives, calculators, computers, and textbooks; productivity packages (word processing, data bases, spreadsheets, graphics); and microcomputer-based laboratories. The Research, Development, and Evaluation (R D & E) course entitled "Action Research: Solving Educational Problems in the Classroom", also scheduled during the Summer Quarter, was followed by the one-credit seminars in the Autumn, Winter, and Spring Quarters. (See the Academic Challenge Program (ACP) Description section.)

Innovative Activities and Action Research

The innovative activities developed, implemented, and evaluated through action research projects during the 1988-1989 ACP involved art, mathematics, reading, science, social studies,

and writing and were implemented in classrooms which included kindergarten through eighth grade students, learning disabled students, and preservice elementary school teachers. The common thread among all the innovations was the deliberate integration of technology into the teaching and learning process. The types of technology that were used included the calculator, computer, overhead projector, and videotape camera and player.

Evaluation Procedures

Pretest data reflecting the classroom teachers' attitudes and perceptions related to educational technology and educational research was collected during the program orientation meeting. In addition, the teachers were given log books in which to record their perceptions, thoughts reactions, and noteworthy events related to the courses, their action research, and the program. This data along with other measures were collected and compared to data collected at the culmination of the program.

Evaluation Results

Two 20-item instruments were created, tested, and revised resulting in two 17-item instruments to measure the attitudes and perceptions of teachers related to Educational Technology and Educational Research. A semantic differential format with identical pairs of adjectives for both instruments was used. The responses were scored based upon the project director's and research course instructor's view as to what the ideal teacher attitudes and perceptions related to Educational Technology and Educational Research should be. The participants responded to these instruments in June, 1988 before the first class in July, 1988; at the end of the program in June, 1989; and approximately seven months after they had finished their formal participation in the program (February, 1990). The internal consistency reliabilities for these attitude and perception scales range from .70 to .85 and are reported in Table 1.

Table 1. Internal Consistency Reliability Estimates for Attitudes and Perceptions Related to Educational Technology and Educational Research

Instrument	No. of Items	Cronbach's Alpha
[1]ATEC	17	0.81
ARES	17	0.70
BTEC	17	0.85
BRES	17	0.82
CTEC	17	0.76
CRES	17	0.81

[1]Note A = Pretest, B = Posttest, C = Follow-up test, TEC = Technology, and RES = Research e.g., ATEC = Pretest for Attitudes and Perceptions of Educational Technology)

The means and standard deviations for the Pre, Post, and Follow-up responses to the attitude/perceptions instruments are given in Table 2. The program involved 19 participants but only 17 returned for the follow-up evaluation. As can be seen by inspection of the statistics in Table 2, the mean scores increased substantially from Pretest to Posttest and continued to show an upward trend in the Follow-up responses. This change was revealed for the attitudes and perceptions related to both Educational Technology and Educational Research.

Table 2. Means and Standard Deviations for Attitudes and Perceptions Related to Educational Technology and Educational Research

		TRIAL		
		Pre	Post	Follow-up
Variable				
TEC	MEAN	67.24	77.47	79.59
	SD	7.50	5.48	4.95
	N	17	17	17
RES	MEAN	64.59	75.12	78.94
	SD	6.29	6.10	4.32
	N	17	17	17

A MANOVA with repeated measures over the three Trials (Pre, Post, and Follow-up) was computed and these results are given in Table 3. The multivariate statistics reveal highly significant differences across Trials.

Table 3. Repeated Measures (Pre, Post, and Follow-up) MANOVA of Attitudes and Perceptions Related to Educational Technology and Educational Research

Multivariate: Educational Technology & Educational Research

Source of Var	Wilks	MS(df)	Error(df)	F	p
Trial	0.23	4	62	16.57	0.000

Univariate: Educational Technology

Source of Var	SS	Df	MS	F	p
Within Cells	704.24	32	22.01		
Trial	1483.76	2	741.88	33.71	0.000

Univariate: Educational Research

Source of Var	SS	Df	MS	F	p
Within Cells	742.86	32	23.21		
Trial	1878.47	2	939.24	40.46	0.000

Table 3 also includes the univariate ANOVA results for attitudes and perceptions related to Educational Technology and Educational Research. The multivariate differences are the result of changes in the attitudes and perceptions related to both Educational Technology and Educational Research.

Table 4. Multiple Comparison Follow-up to Univariate MANOVA**

Educational Technology

		BTEC	CTEC
ATEC	t-value	5.89	6.71
	p-value	0.000**	0.000**
BTEC	t-value		2.07
	p-value		0.055

Summary Diagram:

ATEC	BTEC	CTEC
66.68	76.47	79.59

Educational Research

		BRES	CRES
ARES	t-value	4.82	7.78
	p-value	0.000**	0.000**
BRES	t-value		2.47
	p-value		0.025

Summary diagram:

ARES	BRES	CRES
64.42	73.68	78.94

**Note: Bon Ferroni correction for multiple t-tests requires a p-value of .017 to preserve an experiment error rate of p = 0.05.

Paired t-tests were computed comparing the Pre, Post, and Follow-up means for each of the attitude and perception scales (see Table 4.). Since three comparisons were made using each dependent variable, the Bon Ferroni method was used to determine that a p-value of 0.017 or less was necessary for significance in order to maintain an experiment-based alpha rate of 0.05 or less. The results indicate that the Pretest means for both the Educational Technology and the Educational Research scales were significantly ($p < 0.05$) different from their respective Posttest

and Follow-up scale means. This indicates that the changes were decisive and durable.

The nature of the changes were further explored using box-plots (see Figures 2 and 3).

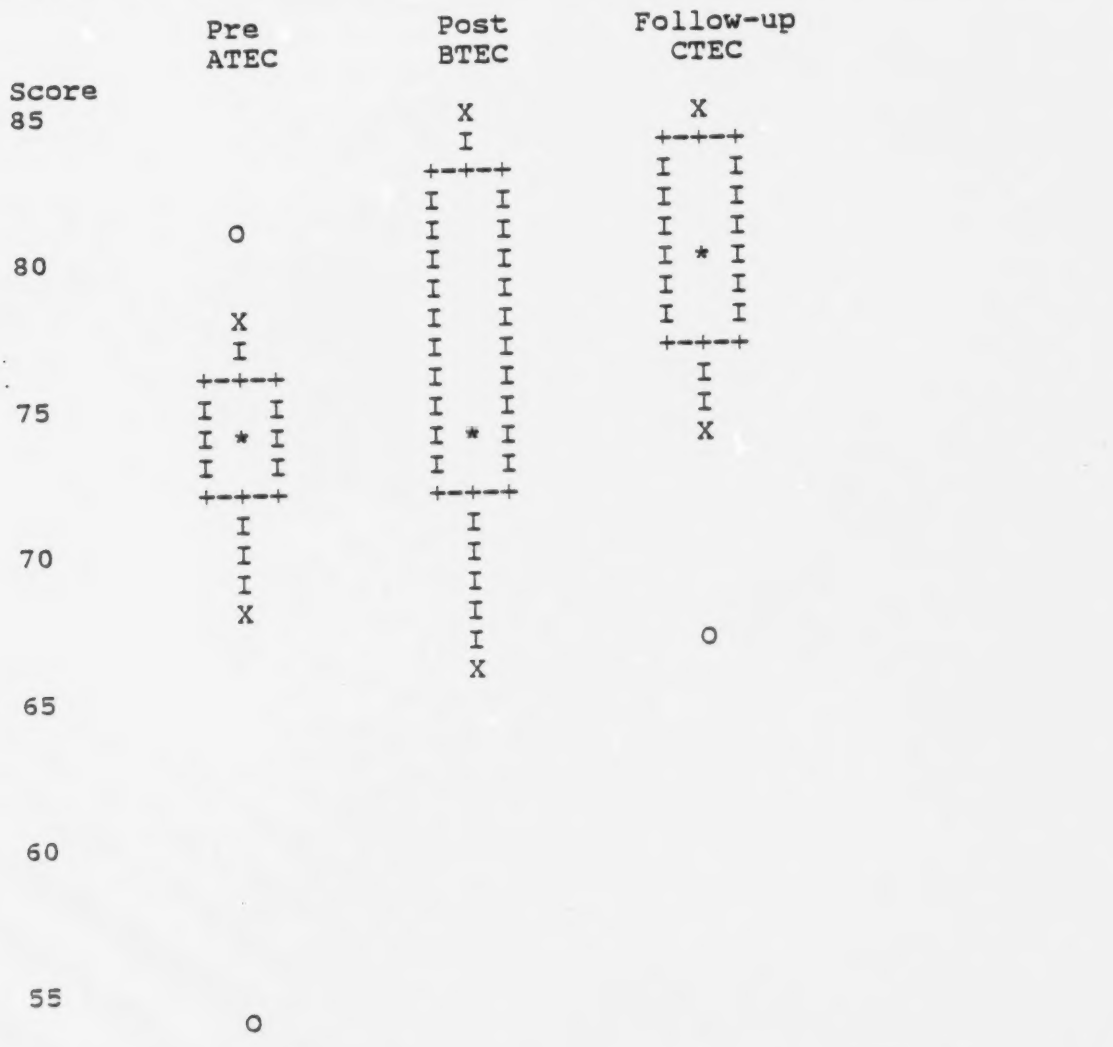

Figure 2 Box-Plot Summary for ATEC, BTEC, and CTEC

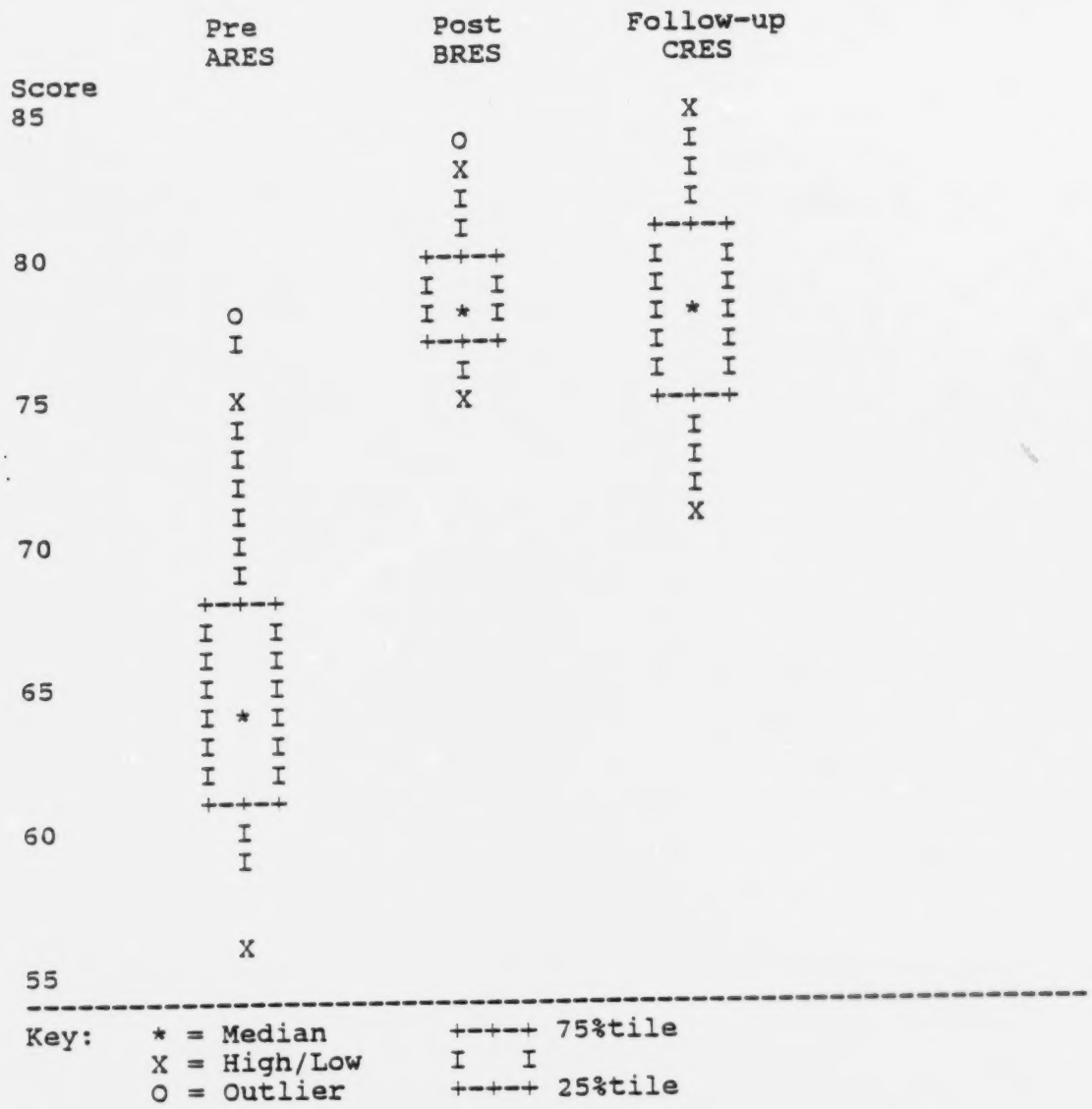

Figure 3 Box-Plot Summary for ARES, BRES, and CRES

For the Educational Technology, some of the individual scores definitely moved toward the ideal while the median remained the same. This was caused by a few participants making gains. The follow-up graph indicates that participants with lower Pretest scores responded more consistently with the ideal. After some practical experience with technology in the classroom they had a more positive feeling about its value and use.

The box-plots for the attitudes and perceptions related to Educational Research also reveal the nature of the changes. The participant distribution of scores went from a generally dispersed group to a much more positive and homogeneous group.

Table 5. Attitudes and Perceptions Related to Educational Technology and Educational Research: Means, Standard Deviations, and Paired T-test Statistics

		TRIAL	
		Pre	Post
Variable			
TEC	MEAN	66.68	76.47
	SD	7.45	6.05
	N	19	19
RES	MEAN	64.42	73.68
	SD	6.03	7.27
	N	19	19

Table 6. Repeated Measures (Pre and Post) MANOVA of Attitudes and Perceptions Related to Educational Technology and Educational Research

Multivariate: Educational Technology & Educational Research

Source of Var	Wilks	F	MS(df)	Error(df)	p
Trial	0.31	19.04	2	17	0.000

Univariate: Educational Technology

Source of Variation	SS	Df	MS	F	p
Within Cells	472.58	18	26.25		
Trial	910.42	1	910.42	34.68	0.000

Univariate: Educational Research

Source of Variation	SS	Df	MS	F	p
Within Cells	630.84	18	35.05		
Trial	815.16	1	815.16	23.26	0.000

The attitudes and perceptions of the participants moved much closer to the ideal and the members of the group came together in their feelings. In the Follow-up scores it can be seen that seven months after finishing the program the attitudes and perceptions of the group again returned to the more heterogeneous grouping but with the same proximity to the ideal.

Tables 5, 6, and 7 present the results of the same series of analyses that have been presented in Tables 1, 2, 3, and 4. The difference is that the later tables include data from all 19 of the participants over the Pretest and Posttest responses. The two who did not return for the Follow-up session and are not included in the previous analyses are included in Tables 5, 6, and 7 analyses.

Table 7. T-test Comparisons of the Pre and Post Attitudes and Perceptions Related to Educational Technology and Educational Research

		BTEC	ARES	BRES
ATEC	t-value	5.89	1.23	. .
	p-value	0.000	0.236	.
	N	19	19	. .
ARES	t-value	. .	. .	4.82
	p-value	.	.	0.000
	N	. .	. .	19
BTEC	t-value	. .	. .	1.92
	p-value	.	.	0.070
	N	. .	. .	19

The results are basically the same with highly significant changes from Pretest to Posttest assessments. The univariate differences in Table 6 indicate that both measures contribute to the differences.

Table 8. Pearson Product-Moment Correlation Coefficients for Attitudes and Perceptions Related to Educational Technology and Educational Research

Variable		ATEC	ARES	BTEC	BRES	CTEC	CRES
ATEC	r[1]	1.000	0.301	0.439	0.151	0.311	0.172
	p		0.210	0.060	0.537	0.224	0.509
	N		19	19	19	17	17
ARES	r		1.000	0.060	0.219	0.012	0.314
	p			0.808	0.369	0.963	0.219
	N			19	19	17	17
BTEC	r			1.000	0.563	0.676	0.524
	p				0.012	0.003	0.031
	N				19	17	17
BRES	r				1.000	0.225	0.287
	p					0.385	0.264
	N					17	17
CTEC	r					1.000	0.825
	p						0.000
	N						17
CRES	r						1.000

[1]Note: r = correlation coefficient, p = alpha level, and N = sample size

The Follow-up t-tests in Table 7 indicate that the gains on each scale are highly significant and that differences related to attitudes and perceptions of Educational Technology were not different from those related to Educational Research.

The Pearson Product-Moment Correlations were computed for scores on the Pretest, Posttest, and Follow-up scores for both scales. These are given in Table 8. Generally the attitudes and perceptions on the Posttest scales and the Follow-up scales show significant relationships. If the participant was positively disposed and near the ideal perception on the Educational Technology scale then they tended to have similar responses on the Educational Research scale.

In summary, the quantitative data analysis indicates that based upon the attitude and perception scales the participants made significant growth toward the ideal as perceived by the program staff. This growth appeared to remain at a constant level or perhaps even continued to move slightly upward over time.

Accounts of the 1988-1989 OSUN Academic Challenge Program have appeared in various city and county newspapers and in publications of The Ohio State University. Information has been distributed at department, university, and college meetings and at various professional education conferences. Participants and staff in the 1988-1989 Academic Challenge Program have presented overviews of the program, their innovative teaching materials, and their research findings at the following conferences: Conference for Developing Inquiring Professionals, International Consortium for Research in Science and Mathematics Education, National Association for Research in Science Teaching, National Science Teachers Association, Ohio Council of Teachers of English and Language Arts, Ohio Council of Teachers of Mathematics, Ohio Council for the Social Studies, Phi Beta Delta Honor Society for International Scholars, School Science and Mathematics Association, and the Science Education Council of Ohio. In addition, two of the ACP teachers have published their innovative activities in the refereed journal School Science and Mathematics. Follow-up data indicate that several of the ACP teachers have assumed leadership roles in their district and have made presentations at inservice meetings, board of education meetings, and professional education conferences. Of note, many of the participants have been accepted into or are near completion of their Master's Program.

As a result of the OSUN Academic Challenge Program the quality of communication and collaboration between university teacher educators and classroom teachers has been improved and a cadre of teachers has been identified that can provide leadership in education research and the development, implementation, and evaluation of effective innovative teaching materials and methods as well as provide exemplary classrooms as field sites for preservice education students. It is my belief that the key to the success of action research lies in the empowerment of classroom teachers and genuine collaboration among classroom and university educators. Genuine collaboration between classroom teacher-researchers and university teacher-researchers is characterized by mutual respect; encouragement; support; continuous, open communication; and unfailing good humor. The ultimate goal is not to translate research into practice, but rather to move research into practice.

BIBLIOGRAPHY

Allan, K. K., & Miller, M. S. (1990, Summer). Teacher-researcher collaboration: Cooperative professional development. Theory into Practice, 24(3), 196-202.

Allen, J., Combs, J., Hendricks, M., Nash, P., & Wilson, S. (1988, April). Studying change: Teachers who become researchers. Language Arts, 65(4), 379-387.

Applebee, A. N. (1987, November). Musings . . . Teachers and the process of research. Language Arts, 64(7), 714-716. (Reprinted from Research in the Teaching of English, 1987, 21, 5-7).

Bissex, G. (1986, September). On becoming teacher experts: What's a teacher-researcher? Language Arts, 63(5), 482-484.

Bolster, A. S., Jr. (1983, August). Toward a more effective model of research on teaching. Harvard Educational Review, 53(3), 294-308.

Brophy, J. E. (1983, March). Classroom organization and management. The Elementary School Journal, 83(4), 265-283.

Burton, F. R. (1986, November). Research currents: A teacher's conception of the action research process. Language Arts, 63(7), 718-723.

Carr, W., & Kemmis, S. (1986). Becoming critical: Education, knowledge, and action research. Philadelphia: The Falmer Press. Casanova, U. (1989, January). Research and practice: We can integrate them. NEA Today, 7(6), 44-49.

Chall, J. S. (1986, April). The teacher as scholar. The Reading Teacher, 39(8), 792-797.

Clark, C. M. (1979, October). Five faces of research on teaching. Educational Leadership, 37(1), 29-32.

Cochran-Smith, M., & Lytle, S. L. (1990, March). Research on teaching and teacher research: The issues that divide. Educational Researcher, 19(2), 2-11.

Corey, S. (1953). Action research to improve school practices. New York, NY: Bureau of Publications, Teachers College, Columbia University.

Ebbutt, D. (1985). Educational action research: Some general concerns and specific quibbles. In R. G. Burgess (Ed.), Issues in educational research: Qualitative methods (pp. 152-174). London: The Falmer Press.

Elliott, J. (1987, June). Educational theory, practical philosophy and action research. British Journal of Educational Studies, 35(2), 149-169.

Elliott, J. (1985). Facilitating action-research in schools: Some dilemmas. In R. G. Burgess (Ed.), Field methods in the study of education (pp. 235-262). London: The Falmer Press.

Elliott, J. (1978). What is action-research in schools? Journal of Curriculum Studies, 10, 355-357.

Elliott, J., & Adelman, C. (1973). Supporting teachers' research in the classroom. The New Era, 54, 210-213, 215.

Emans, R. (1984, Fall). Research summaries: Is the purpose of educational research to make the job of teachers easier? Action in Teacher Education, 6(3), 53-64.

Enochs, L. G., & Hortin, J. A. (1985). Naturalistic inquiry: Future research directions for the classroom teacher. The Teacher Educator, 21(1), 28-32.

Florio-Ruane, S., & Dohanich, J. B. (1984, November). Research currents: Communicating findings by teacher/researcher deliberation. Language Arts, 61(7), 712-716.

Garrison, J. W., & Macmillan, C. J. B. (1986/1987, Summer). Teaching research to teaching practice: A plea for theory. Journal of Research and Development in Education, 20(4), 38-43.

Griffin, G. A., & Barnes, S. (1986, Winter). Using research findings to change school and classroom practices: Results of an experimental study. American Educational Research Journal, 23(4), 572-586.

Hatch, J. A., & Bondy, E. (1986). The researcher-teacher relationship: Observations and implications from naturalistic studies in classrooms. Journal of Research and Development in Education, 19(4), 48-56.

Hoover, N. L. (1985, January). Teachers' self-reports of critical decisions in teaching reading. Reading Teacher, 38(4), 440-445.

Hopkins, D. (1985). A teacher's guide to classroom research. Philadelphia: Milton Keynes. Open University Press.

Huling, L. L., Trang, M., & Correll, L. (1981). Interactive research and development: A promising strategy for teacher educators. Journal of Teacher Education, 32(6), 13-14.

Johnston, M. (1990). Experience and reflections on collaborative research. Qualitative Studies in Education, 3(2), 173-183.

Kelly, A. (1985). Action research: What is it and what can it do? In R. G. Burgess (Ed.), Issues in educational research: Qualitative methods (pp. 129-151). London: The Falmer Press.

Kemmis, S., & McTaggert, R. (1988). The action research planner. Geelong, Victoria, Australia: Deakin University Press.

Kyle, D. W., & McCutcheon, G. (1984, April-June). Collaborative research: Development and issues. Journal of Curriculum Studies, 16(2), 173-179.

Lasky, L. R. (1978, March). Personalizing teaching: Action research in action. Young Children, 33(3), 58-64.

Lewin, K. (1946). Action research and minority problems. Journal of Social Issues, 1, 34-36.

McConaghy, J. (1986, November). On becoming teacher experts: Research as a way of knowing. Language Arts, 63(7), 724-728.

McConaghy, T. (1987, April). Teachers as researchers: Learning through teaching. Phi Delta Kappan, 68, 630-631.

McKernan, J. (1988a). Teacher as researcher: Paradigm and praxis. Contemporary Education, 59(3), 154-158.

McKernan, J. (1988b). The countenance of curriculum action research: Traditional, collaborative, and emanicpatory-critical conceptions. Journal of Curriculum and Supervision, 3(3), 173-200.

Oldroyd, D., & Tiller, T. (1987). Change from within: An account of school-based collaborative action research in an English secondary school. Journal of Education for Teaching, 12(3), 13-27.

Oliver, B. (1980, February). Action research for inservice training. Educational Leadership, 37(5), 394-395.

Patterson, L. (1985, November). Becoming a teacher/researcher: Another avenue to excellence. English Journal, 74, 98-102.

Plant, R. M. (1986, June). Reading research: Its influence on classroom practice. Educational Research, 28(2), 126-131.

Rainey, B. G. (1973, February). Action research: A valuable professional activity for the teacher. The Clearing House, 47, 371-375.

Ross, D. D. (1984, Winter). A practical model for conducting action research in public school settings. Contemporary Education, 55(2), 113-117.

Rudduck, J. (1985, October). Teacher research and research-based teacher education. Journal of Education for Teaching, 11(3), 281-289.

Sagor, R. (1991). What Project Learn reveals about collaborative action research. Educational Leadership, 48(6), 6-10.

Shuter, M. B. (1987, December). Classroom action research. Unpublished manuscript.

Shumsky, A. (1958). The action research way of learning. New York, NY: Teachers College Press, Columbia University.

Shymanksy, J. A., & Kyle, Jr. W. C. (1991, March). Establishing a research agenda: The critical issues of science curriculum reform. Report of a conference held April 8, 1990. Sponsored by the National Association for Research in Science Teaching and funded by the National Science Foundation. Atlanta, Ga.

Spector, B. S., & Phillips, E. R. (1989). Broadening teachers' perspectives on research. Journal for Science Teacher Education, 1, 4-9.

Taba, H., & Noel, E. (1957). Action research: A case study. Washington, DC: Association for Supervision and Curriculum Development.

Walberg, H. J. (1985, March). Synthesizing education research. The Education Digest, 50(7), 9-13.

Watts, H. (1985, October). When teachers are researchers, teaching improves. The Journal of Staff Development, 6(2), 118-127.

Westbrook, C., Loomis, A., Coffina, J., Adelberg, J., Brooks, S., & Ellis, S. (1985, October). Classroom research: A promising model for staff development. Journal of Staff Development, 6(2), 128-132.

White, R. T., & Tisher, R. P. (1986). Research on natural sciences. In M. C. Wittrock (Ed.), Handbook of Research on Teaching Third Edition (pp. 874-905). New York, NY: Macmillan Publishing Company.